

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (currently amended) A terminal for providing a virtual environment interface to server means which maintains said virtual environment as a plurality of zones, comprising:

a client providing a user interface to the virtual environment to allow a user to control an avatar in the virtual environment; and

apparatus for estimating the likelihood of said avatar, under the control of said user in the virtual environment, moving within a predetermined range of a boundary, the apparatus comprising:

recording means for recording the position of the avatar at intervals to obtain movement data;

means for storing data as to the relative frequency of occurrence of different categories of said movement;

means arranged to read, from the stored data, frequency data for categories of movement such as would correspond to a potential movement of the avatar from its current position into a position within said predetermined range of said boundary;

wherein the client is arranged to obtain information from said server means about the status of the adjacent zone before the avatar enters the adjacent zone only when the likelihood of the avatar moving within the predetermined range of the boundary of said adjacent zone is above a threshold.

2. (currently amended) ~~A~~The terminal according to claim 1 wherein said threshold is determined in dependence upon a cost function.

3. (currently amended) ~~A~~The terminal according to claim 1 wherein said threshold is determined in dependence upon the amount of communication traffic and/or the time taken for the communication with the server means.

4. (currently amended) ~~A~~The terminal according to claim 1 wherein said means for storing data is arranged to discard data relating to movement after a set period of time.

5. (currently amended) ~~A~~The terminal according to claim 1 wherein said recording means is adapted to record the position of said avatar at regular intervals of time in said virtual environment.

6. (currently amended) ~~A~~The terminal according to claim 1 wherein the potential movement of the avatar takes into consideration obstructions to the movement of said avatar within said virtual environment.

7. (currently amended) ~~A~~The terminal according to claim 1 wherein said predetermined range is dependent upon a range of awareness of said avatar within which said avatar can experience the virtual environment.

8. (currently amended) ~~A~~The terminal according to claim 1 wherein said categories of movement are determined by run lengths.

9. (currently amended) ~~A~~The terminal according to claim 1 wherein said categories of movement are determined by run lengths within a predefined corridor.

10. (currently amended) ~~A~~The terminal according to claim 1 wherein said categories of movement are determined by the movement of said avatar into areas around said avatar.

11. (currently amended) ~~A~~The terminal according to claim 1 wherein said categories of movement are determined by directions and distances of movement of said avatar.

12. (currently amended) ~~Apparatus~~An apparatus for estimating the likelihood of an avatar, under the control of a user in a virtual environment, moving within a predetermined range of a boundary, the apparatus comprising:

recording means for recording the position of the avatar at intervals to obtain movement data;

means for storing data as to the relative frequency of occurrence of different categories of said movement; and

means arranged to read, from the stored data prior to the avatar moving across the boundary, frequency data for categories of movement such as would correspond to a

potential movement of the avatar from its current position into a position within said predetermined range of said boundary.

13. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said means for storing data is arranged to discard data relating to movement after a set period of time.

14. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said recording means is adapted to record the position of said avatar at regular intervals of time in said virtual environment.

15. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein the potential movement of the avatar takes into consideration obstructions to the movement of said avatar within said virtual environment.

16. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said predetermined range is dependent upon a range of awareness of said avatar within which said avatar can experience the virtual environment.

17. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said categories of movement are determined by run lengths.

18. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said categories of movement are determined by run lengths within a predefined corridor.

19. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said categories of movement are determined by the movement of said avatar into areas around said avatar.

20. (currently amended) ~~Apparatus~~ The apparatus according to claim 12 wherein said categories of movement are determined by directions and distances of movement of said avatar.

21. (currently amended) A system for providing a distributed virtual environment comprising:

one or more servers for maintaining said virtual environment as a plurality of zones, said one or more servers receiving communication from a client to allow a user to control an avatar in the virtual environment; and

an apparatus for predicting the likelihood of said avatar moving within a predetermined range of a boundary of a zone in the virtual environment;

wherein said one or more servers is arranged to communicate with the client to provide information on the status of one or more further zones in the virtual environment before the avatar enters said one or more further zones when the likelihood of the avatar moving within a predetermined range of the boundary of said one or more further zones predicted by the apparatus is above a threshold.

22. (currently amended) ~~A~~The system according to claim 21 wherein said threshold is determined in dependence upon a cost function.

23. (currently amended) ~~A~~The system according to claim 21 wherein said threshold is determined in dependence upon the amount of communication traffic and/or the time taken for the communication with the one or more servers.

24. (currently amended) A method of operating a computer terminal to provide a virtual environment interface to server means which maintain said virtual environment as a plurality of zones, the method comprising:

controlling a client which provides a user interface to the virtual environment to allow a user to control an avatar in the virtual environment; and

estimating the likelihood of said avatar, under the control of said user in a virtual environment, moving within a predetermined range of a boundary, estimating said likelihood comprising:

recording the position of the avatar at intervals to obtain movement data;

storing data as to the relative frequency of occurrence of different categories of said movement; and

reading, from the stored data, frequency data for categories of movement such as would correspond to a potential movement of the avatar from its current position into a position within said predetermined range of said boundary; and

instructing the client to obtain information from said server means about the status of an adjacent zone before the avatar enters the adjacent zone only when

the likelihood of the avatar moving within the predetermined range of the boundary of said adjacent zone is above a threshold.

25. (currently amended) ~~A~~The method according to claim 24 wherein said threshold is determined in dependence upon the amount of communication traffic and/or the time taken for the communication with the server means.

26. (currently amended) ~~A~~The method according to claim 24 wherein stored movement data is discarded after a set period of time.

27. (currently amended) A storage medium readable by a computer, tangibly embodying a program of storing instructions executable by the ~~for controlling a computer to carry out the~~ a method of claim 24 operating a computer terminal to provide a virtual environment interface to a server which maintains the virtual environment as a plurality of zones, steps of the method comprising:

controlling a client which provides a user interface to the virtual environment to allow a user to control an avatar in the virtual environment; and

estimating the likelihood of said avatar, under the control of said user in a virtual environment, moving within a predetermined range of a boundary, estimating said likelihood comprising:

recording the position of the avatar at intervals to obtain movement data;

storing data as to the relative frequency of occurrence of different

categories of said movement; and

reading, from the stored data, frequency data for categories of movement
such as would correspond to a potential movement of the avatar from its current
position into a position within said predetermined range of said boundary; and
instructing the client to obtain information from said server about the status of an
adjacent zone before the avatar enters the adjacent zone only when the likelihood of the
avatar moving within the predetermined range of the boundary of said adjacent zone is
above a threshold.

28. (currently amended) ~~A signal-carrying computer-implementable~~
~~implemented~~ instructions for controlling a computer to carry out the method of claim
24 for processing signals related to provide a virtual environment interface to at least one
server which maintains said virtual environment as a plurality of zones, the method
comprising:

controlling a client which provides a user interface to the virtual environment to
allow a user to control an avatar in the virtual environment; and
estimating the likelihood of said avatar, under the control of said user in a virtual
environment, moving within a predetermined range of a boundary, estimating said
likelihood comprising:

recording the position of the avatar at intervals to obtain movement data;
storing data as to the relative frequency of occurrence of different
categories of said movement; and

reading, from the stored data, frequency data for categories of movement
such as would correspond to a potential movement of the avatar from its current
position into a position within said predetermined range of said boundary; and

instructing the client to obtain information from said server about the status of an adjacent zone before the avatar enters the adjacent zone only when the likelihood of the avatar moving within the predetermined range of the boundary of said adjacent zone is above a threshold.

29. (currently amended) In a computer system having at least one server for providing a virtual environment having a plurality of zones in which an avatar may move in response to user control signals received from a client, a method comprising:

monitoring movement of the avatar within the virtual environment for a period of time;

determining a pattern of movement of the avatar based on the monitored movement;

predicting a likelihood of the avatar, based on the determined pattern of movement, of moving to within a predetermined range of a boundary of a zone in which the avatar is currently positioned;

determining whether or not the predicted likelihood exceeds a threshold; and

obtaining information for a zone adjacent to the zone in which the avatar is currently positioned before the avatar enters the adjacent zone when the predicted likelihood exceeds the threshold.

30. (previously presented) The method of claim 29 wherein the threshold is determined in dependence upon a cost function, the amount of communication traffic of the at least one server, or an amount of time taken for the communication with the at least one server.

31. (previously presented) The method of claim 29 wherein monitoring the movement of the avatar includes obtaining a sliding window of data samples describing the avatar movement.

32. (previously presented) The method of claim 29 wherein predicting the likelihood of the avatar of moving to within the predetermined range of the boundary includes considering features within the virtual environment which restricts movement of the avatar.

33. (previously presented) The method of claim 29 wherein predicting the likelihood of the avatar of moving to within the predetermined range of the boundary includes considering features within the virtual environment which restricts an ability of the avatar to experience the virtual environment.

34. (previously presented) The method of claim 29 wherein predicting the likelihood of the avatar of moving to within the predetermined range of the boundary includes referring to a prediction model having a data table of run lengths of avatar movement and corresponding likelihood to cross a zone boundary.